

Population status and habitat assessment of Cheer Pheasant (*Catreus wallichii*) in Western Nepal

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Abstract The Cheer Pheasant (*Catreus wallichii*) is a protected species found abundantly to the west of Kaligandaki River. This study was conducted in the Myagdi district located in the western part of Kaligandaki River from October 2016 to June 2017. Our aim was to assess the habitat and population status of Cheer Pheasant, using acoustic survey and quadrat methods. A total of 38 breeding individuals were estimated in 7 bird/km² density. The study also revealed that Cheer Pheasants showed a preference for exposure components of the habitat. They preferred moderately steep eastern slopes (10–35°) and steep southern slopes (35–67°) between 1800–2400 m elevations. Additionally low tree density and high herbs density showed a significant effect on the habitat choice of the species. Poaching and habitat destruction are the major threats in the study site, calling upon a strategic management plan for the long-term conservation of the Cheer Pheasant.

Keyword: acoustic survey, quadrat, aspect, slope, elevation

Összefoglalás A bóbítás fácán (*Catreus wallichii*) védett faj, legnagyobb számban a Kaligandaki folyótól nyugatra fordul elő. A Myagdi nevű területen, a folyótól nyugatra végeztünk kutatást a faj élőhelyének és populációja helyzetének felmérésére 2016 október és 2017 június között akusztikus és kvadrát felmérési módszer alkalmazásával. A területen összesen 38 költő egyedet becsültünk, 7 madár/km² sűrűségben. A vizsgálatból az is kiderült, hogy a faj a kitett élőhelyeket preferálja, így a közepesen meredek keleti lejtőket (10–35°) és a meredek déli lejtőket (35–67°) részesíti előnyben, továbbá az alacsony faboritottság és a magas lágyszárú borítás is jelentős szerepet játszik élőhelyválasztásában. A fajra a vizsgálati területen az orrvadászat és az élőhelyek pusztítása jelenti a legnagyobb veszélyt, ezért a bóbítás fácán hosszú távú megőrzésére stratégiai kezelési tervet szükséges kidolgozni.

Kulcsszavak: akusztikus felmérés, kvadrát, tájolás, lejtő, tengerszintfeletti magasság

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Introduction

Cheer Pheasant (*Catreus wallichii*) belongs to the order Galliformes and family Phasianidae. It is one of the native birds of the western Himalaya foothills distributed in Nepal, India and Pakistan (Garson *et al.* 1992, Grimmett *et al.* 1998, Birdlife International 2014). The species is negatively influenced by human disturbance (Kaul 1989), while the reversibly successional vegetation is a positive impact factor (Garson *et al.* 1992). It has been facing substantial threats due to habitat degradation such as forest fire, deforestation and

agricultural land expansion (Inskipp & Inskipp 2003, Acharya 2006). Changes in land-use patterns and human settlements have also resulted in a decline of the Cheer Pheasant population across its distribution range (Kalsi 1999, Ramesh 2003). Moreover, the poaching of the species is excessive, which has brought the species to the verge of extinction (Birdlife International 2018). Therefore, Cheer Pheasant has been classified as “Vulnerable” in the IUCN Redlist category and Appendix I of CITES. In Nepal, the distribution of this species extended from the west of Kaligandaki River to western Nepal, particularly associated with tall grass steppes, large mountain meadows, pastures, stunted tree and rocky cliffs with sub-tropical coniferous forest (Inskipp & Inskipp 2003, Acharya *et al.* 2004, Budha 2006, Bishta *et al.* 2007). A key distribution area was reported from Annapurna Conservation Area and Rara National Park (Lelloit 1981, Inskipp & Inskipp 2003, Acharya 2006, Singh & K. C. 2008) of an elevation of 900–4500 m. It has been also distributed throughout Dhorpatan Hunting Reserve and western Nepal; however, many of these breeding populations are amounted to 35 individuals (Subedi 2003) with less than a total of 1,000 isolated individuals in Nepal (Inskipp & Inskipp 2003). In this paper, we aimed to describe the abundance and distribution of Cheer Pheasant in the Myagdi district of western Nepal.

Materials and method

Study area

This study was conducted in a Myagdi District of western Nepal (83.46860 E to 28.63330 N). It had been confirmed as a breeding area in previous studies (Singh *et al.* 2011). The study site comprises ecosystems ranging from temperate to sub-alpine habitats with steep slopes consisting of mixed broadleaved and coniferous forests. The land use category of the area includes forest (36.76%), shrub (1.85%), barren land (21.27%) and rock cover (2.61%) (DFO 2016). The forest of Myagdi consists of conifer forests (13.99%), broadleaf forests (49.30%), mixed forest (31.375%) and scrubs (5.32%) (DFO 2016). Temperate and sub-alpine forests, sometimes with an extensive bamboo understory and often on steep slopes are also found in the region. These comprise mixed broadleaves and conifers forests. Kali Gandaki, Myagdi Khola and Raguganga khola are the main river systems of Myagdi district (*Figure 1*). The altitude varies from 900 m to 3200 m (above sea level/asl.) The commonest plants include *Schima wallichii*, *Abis pindrow*, *Alnus nepalensis*, *Ficus auriculata*, *Leucoseptrum canum*, *Saurauia napaulensis*, *Cryptomeria japonica*, *Alangium alpinum* and *Quercus glauca* in the study area. Some important mammalian species recorded from Myagdi e.g. *Uncia uncia*, *Macca assamensis*, *Panthera pardus*, *Felis chaus*, *Muntiacus vaginalis*, *Ailurus fulgens*. The avifauna includes key-stone species such as *Sarcogyps calvus*, *Lophophorus impejanus*, *Tragopan satyra*, *Gyps himalayensis*, *Gypaetus barbatus*.

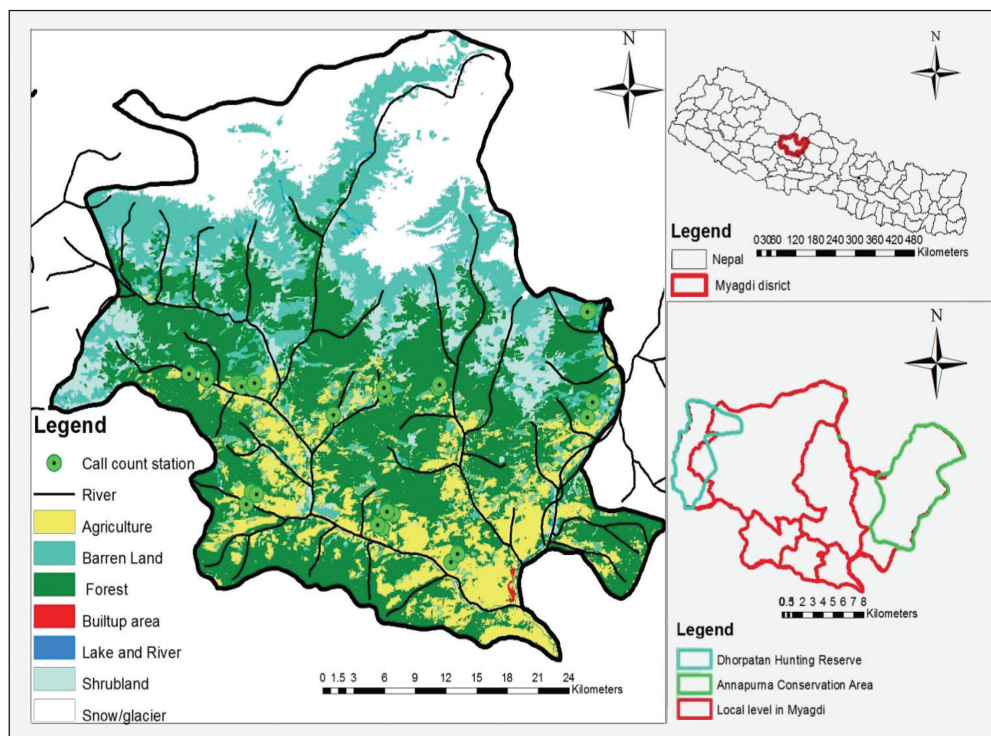


Figure 1. Study area (land cover patterns and sampling stations)
1. ábra Vizsgáló terület (felszínborítások és mintavételi helyek)

Field design

The study area was divided into three potential sites where the presence or absence of Cheer Pheasant was assessed. Those sites were divided into a 5×5 km² grid, providing 16 grids in total, applying Arc GIS 10.1. For field surveys, five grids were randomly selected from each site on the basis of potential area and literature review. A call counting station of 300 m radius was set up in each grid cell and the potential area was divided into three parts.

Surrounding areas of Kaligandaki (28.49987 N, 83.656266 E) are located in the vicinity of Annapurna Conservation areas, 12 km from Beni, the capital of Myagdi. The altitude varies between 900 m to 2500 m asl. This locality was divided into two study sites: i.e. Tapani and Dana. Four acoustic survey stations were established in the vicinity of the study site. Lower Kali Gandaki is the only known area in Nepal where all six Himalayan Pheasant species are found. Surrounding areas of Raguganga (28.5106 N, 83.45335 E) are located 30 km in the north of Beni in southern sites of Dhaulagiri Himal. The elevation varies between 1400 m to 3500 m. It was also divided into four call counting stations. Study sites in the surroundings of Myagdi Khola (28.42772 N, 83.296377 E) are located about 5 to 40 km far from Myagdi headquarters. The elevation range is 1000 to 3500 m. This study area was also divided into 17 acoustic counting stations.

Methodology

A total of 25 surveys were conducted in the study area from October 2016 to June 2017. We applied dawn and dusk **acoustic survey** techniques to collect the presence data during the breeding season. Call counting started at 30 minutes before sunrise and continued 60 minutes after sunset. The distance between the two call counting stations was 200 m. The call of the species has been identified by the help of an expert and duplication of calls was removed from the datasheet for the identification of unique call numbers.

$$\text{Encounter rate } (\Sigma\bar{X}) = \frac{\text{Replication days of total survey times}}{\text{number of birds estimated by call counting station}}$$

BPE ($\Sigma\bar{X}$) = 0.75, where $\Sigma\bar{X}$ = Total mean of the individual, populations were estimated by pool mean and pool variance

$$\text{Mean population density} = \frac{(\text{mean number of calling birds in an area})}{(\text{the total area covered in each station})}$$

In order to analyze the potential habitat used by Cheer Pheasant, the vegetation density was determined by quadrates methods at all calling and non-calling sites. Trees, shrubs, herbs were sampled by quadrates of 10×10 m, 5×5 m, 1×1 m respectively. Phytosociological parameters were also measured i.e. slope, aspect, elevation ground cover and distance to human settlement. All parameters were noted for each station. The population was the dependent variable and others (groundcover, vegetation density and distance of human settlement) were predictors. The R version 2.15.2 (R Development Core Team 2012) was used for correlation analysis. Digital Elevation Model was used to digitize i.e. slope, aspect and elevation.

Results and discussions

Population status

In total, 38 breeding individuals have been estimated from 25 call counting stations, whereas Cheer Pheasant calls were recorded from 17 sites. In total, 48.97 mean call and 63 maximum calls were recorded from each different call counting station with a detection rate of 1.50 bird/station (*Figure 2*). A total of 7 bird/km² mean population density of the Cheer Pheasant has been estimated from the study area, where 4 and 10 bird/km² was a non-acoustic range of calling sites. It is based on the mean of 2.94 in 300 m radius of call counting stations. Similarly, 7.5 bird/km² densities were estimated by Singh *et al.* (2011) in the uniform habitats of Muri Myagdi. Relatively lower population densities of 2.65 bird/km² and 1.98 birds/km² have been reported by Acharya (2006), in Lower Kali Gandaki Valley and Young *et al.* (1987) at Ghasa Mustang might be a different elevation range from the present study area. Relatively stable population densities such as 8 birds/km² (Subedi 2003) and 7.08 bird/

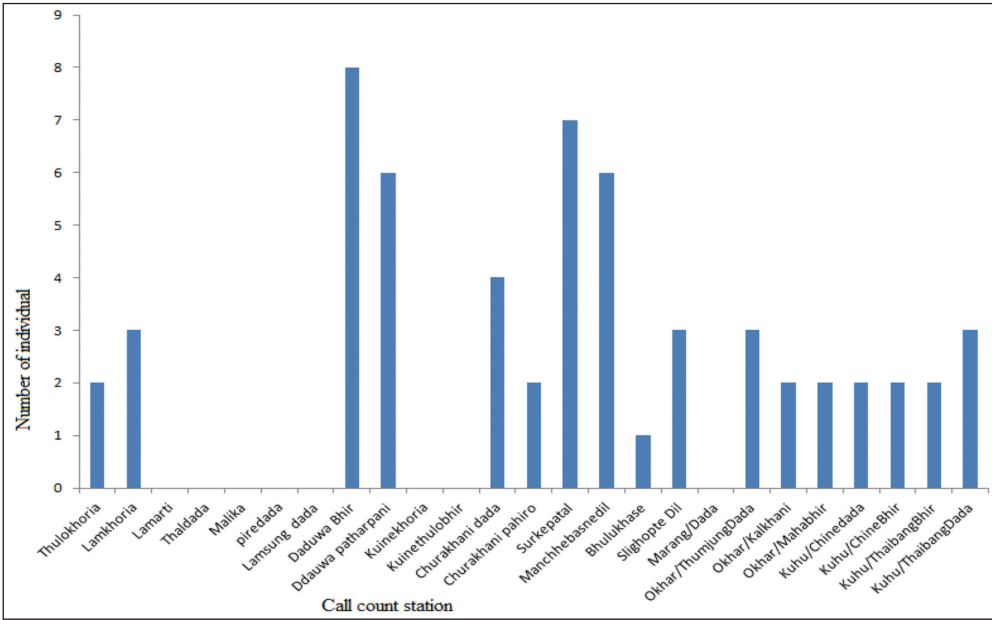


Figure 2. Number of calling pheasants for each survey station
 2. ábra Az egyes megfigyelő helyeken hallott fácánok egyedszáma

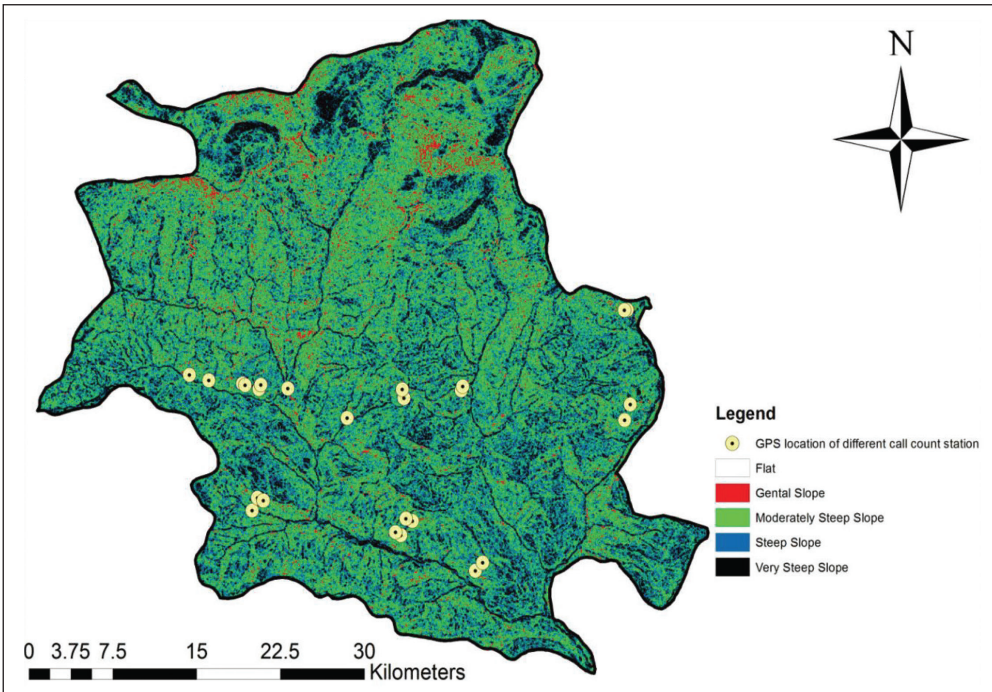


Figure 3. Number of call counting stations in various slope classes
 3. ábra Az egyes megfigyelő helyek száma különböző meredekségű lejtő osztályokban

km² (Basnet 2014) have been recorded in Dhorpatan hunting reserve which also supports higher density (7.75 birds/km²) of Cheer Pheasant (Basnet 2016) than Bajura district Nepal. Further, a total of 579 individuals have been reported from Azad Jammu Kashmir, while the largest population (n = 434) was noted at Qazi Nag Game Reserve (Iftikhar *et al.* 2017).

Habitat Assessment Survey of Cheer Pheasant

To provide environmental data for the distribution and habitat analysis of Cheer Pheasant, the study area was digitized covering an elevation gradient from 900 m to above 3000 m. Based on slope angles, slopes were also categorized into flat, gentle steep and very steep (*Figure 3*). The area was digitized at South, North, East and West facing aspects (*Figure 4*) at the basis of 600–1200 m, 1200–1600 m, 1600–2400 m, 2400–3000 m and above 3000 m elevation ranges (*Figure 5*). This rare species were densely distributed in the 1800 to 2400 m elevation range with east and south facing slopes while the majority of the individuals were also distributed in moderately steep slope (10–35°) in this study area. Lelloit (1981), Singh *et al.* (2011) reported that the species prefers elevation ranges between 1400–3200 m with South and North facing aspects in Muri and Khibang Myagdi. Similarly, it was reported from a wide elevation range of 701–2400 m in Chail Wildlife Sanctuary India (Gaston & Singh 1980, Akthar *et al.* 2004). Correlations were detected between Cheers population with ground cover ($r = 0.012$, $P > 0.05$) and herbs density ($r = 0.64$, $P < 0.01$), however only herbs density showed significantly positive correlation. The breeding and feeding ecology were significant correlated to dense ground cover (Lelloit 1981, Singh *et al.* 2011). Among the correlations between Cheers population with shrubs ($r = -0.023$, $P > 0.05$), tree density ($r = -0.57$, $P < 0.01$) and distance of human settlement ($r = -0.18$, $P > 0.05$), only tree density showed significantly negative correlations with the population. It indicates that scattered tree and open rocky terrain are the favored habitat of this pheasant species (Baker *et al.* 1918, Ali & Ripely 1968, King 1981, Johnsgard 1986, Roberts 1991, Garson *et al.* 1992, Bisht *et al.* 2007, Awan *et al.* 2014) whereas Singh and K. C. (2008) reported that most of the Cheer Pheasant distribution was closely associated with around the human settlement area in Rara National Park. In comparison with different habitat variables, dense herbs vegetation and scattered tree have been preferred habitat of this species in this study area.

Conclusions

A total of 38 breeding Cheer Pheasant were recorded at 25 call counting stations with 7 bird/km² density. In conclusion, moderately steep slopes (10–35°), steep slope (35–67°), east and south face aspects at 1800–2400 m an elevation range were the most suitable geographical features of the Cheer Pheasant. The scattered tree and dense herb vegetation have played more significant role than other factors in governing the distribution of Cheer Pheasant. Habitat deteriorating, agricultural activities, poaching and livestock grazing were noticeable threats to the species. Hence, a long term sustainable conservation strategic plan is necessary for the protection of this species in the study area.

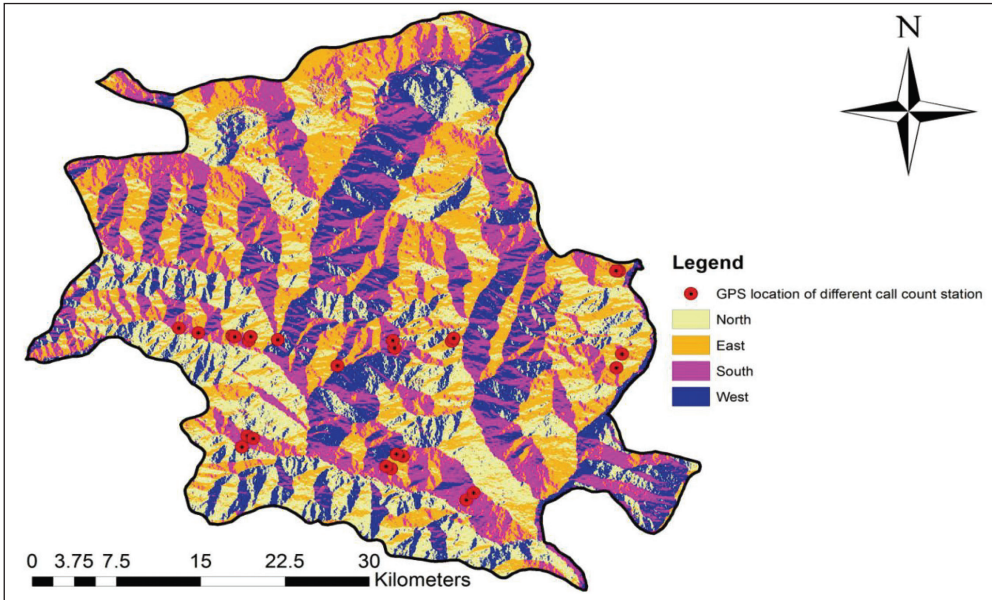


Figure 4. Number of call counting stations in various aspect class
 4. ábra Az egyes megfigyelő helyek száma különböző tájolású lejtők szerinti besorolásban

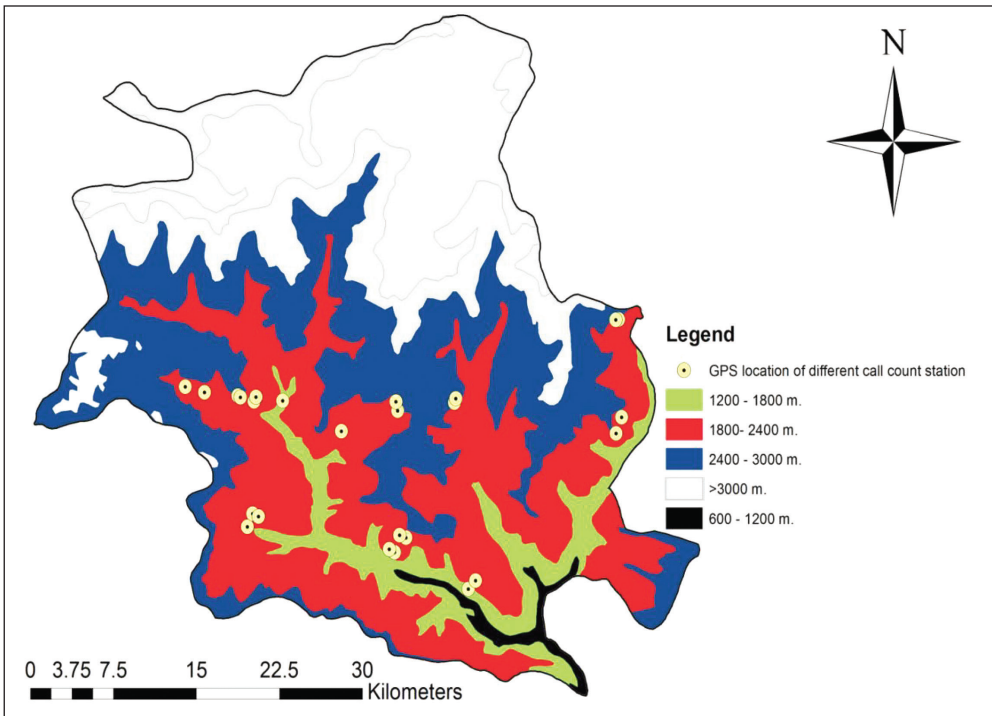


Figure 5. Number of call counting stations in various elevation classes
 5. ábra Az egyes megfigyelő helyek száma különböző tengerszintfeletti magassági osztályokban

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